

## ABSTRACT

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### **Battery Definition for the Mars Environmental Survey Mission (MESUR) Pathfinder**

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The Pathfinder Mars Environmental Survey Mission (MESUR-Pathfinder) is the first of NASA's low cost discovery missions. The purpose of this mission is to demonstrate that this spacecraft design and operation can sustain the cruise, direct entry, descent, and landing on the surface of Mars and operate for one to twelve months while conducting engineering assessment and science investigations. The results of this mission will define and enhance the follow-on missions which are designed to place a network of landers on the Martian surface. Launch is scheduled for the 1996 window with a 1997 Mars landing. The technical requirements, consistent with the low cost approach, make this a challenging mission. In particular, the preliminary design of the Power and Pyrotechnic Subsystem (PPS) calls for a direct energy transfer system which will use two solar arrays, one for the cruise portion of the mission and one for operation on the Martian surface. A power distribution system is based on a secondary silver-zinc (Ag-Zn) battery enhanced by thermal batteries during the Mars entry, descent and landing - pyro events. This paper will focus on a discussion of the Ag-Zn technology baselined for this mission. Although Ag-Zn technology has previously flown on other planetary missions, the requirements of this mission are particularly demanding. A rough timeline for the battery consists of supplying power during launch (Delta launch vehicle), an approximate 8 month cruise with power support for two to three trajectory correction maneuvers (TCMs) and augmentation of the thermal batteries during descent and landing on the Martian surface followed by at least 30 cycles on Mars. To verify that this technology will meet the mission objectives, several characterization and verification ground tests are underway. The variables being investigated are the number of separators, storage temperature, orientation and charge methodology. This paper will describe in detail the results of the ground tests obtained thus far.